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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/837,669	04/18/2001	Paul A. Martin	004-4665-1	9894

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ZAGORIN O'BRIEN & GRAHAM, L.L.P.  
7600B N. CAPITAL OF TEXAS HWY.  
SUITE 350  
AUSTIN, TX 78731

EXAMINER

BULLOCK JR, LEWIS ALEXANDER

ART UNIT	PAPER NUMBER
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2126

DATE MAILED: 12/23/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/837,669

Applicant(s)

MARTIN ET AL.

Examiner

Lewis A. Bullock, Jr.

Art Unit

2126

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-64 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-63 is/are rejected.
- 7) ☒ Claim(s) 64 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4-7. 6) ☐ Other: \_\_\_\_

## DETAILED ACTION

### *Double Patenting*

1. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

2. Claims 1-13 and 16-63 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-42 of copending Application No. 09/551,113. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

3. Claims 1-13 and 16-63 are provisionally rejected under 35 U.S.C. 102(e) as being anticipated by copending Application No. 09/551,113 which has a common inventor and assignee with the instant application. Based upon the earlier effective U.S. filing date of the copending application, it would constitute prior art under 35 U.S.C. 102(e), if published under 35 U.S.C. 122(b) or patented. This provisional rejection under 35 U.S.C. 102(e) is based upon a presumption of future publication or patenting of the copending application. The parent application, 09/551,113 claims all of the details of the current application, 09/837,669, and therefore is rejected based on the parent application. Some of the claims are exact duplicates of the parent application.

This provisional rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the copending application was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131. This rejection may not be overcome by the filing of a terminal disclaimer. See *In re Bartfeld*, 925 F.2d 1450, 17 USPQ2d 1885 (Fed. Cir. 1991).

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. Claims 1-4 and 9-13 are rejected under 35 U.S.C. 102(a) as being anticipated by "Non-Blocking Synchronization and System Design" by GREENWALD.

As to claims 1, 9, 10, 12, and 13, GREENWALD teaches a double-ended concurrent shared object organized as a dynamically sized bi-directional referencing chain of nodes, (deque), the double-ended concurrent shared object empty distinguishing values to indicate spare nodes (node having an Invalid value for push operations) and supporting concurrent non-interfering opposing-end accesses (pushTop / popTop / pushBottom / and popBottom operations) (pg. 219 and 220) for states of two or more values (pg. 217-218, "Figures D.19 and D.20 contain an implementation of a

concurrent deque that solves the problem of simultaneous popBottom and PopTop on a one element deque...thus allowing top and bottom to be stored in two independent words and to proceed mostly in parallel.").

As to claim 2, GREENWALD teaches the concurrent non-interfering opposing-end accesses include pop-type accesses (popTop / and popBottom operations) (pg. 219 and 220).

As to claim 3, GREENWALD teaches the concurrent opposing-end accesses are push and pop-type accesses, respectively, and wherein the push and pop-type accesses are non-interfering for states of one or more values (pushTop / popTop / pushBottom / and popBottom operations) (pg. 219 and 220).

As to claim 4, GREENWALD teaches the concurrent opposing-end accesses are push-type accesses and wherein the push-type accesses are non-interfering for all states (pushTop / popTop / pushBottom / and popBottom operations) (pg. 219 and 220).

As to claim 11, GREENWALD teaches the data structure includes a double-ended queue (deque); and wherein the access operations include opposing-end variants of push and pop operations (pushTop / popTop / pushBottom / and popBottom operations) (pg. 219 and 220).

6. Claims 5, 16, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over “Non-Blocking Synchronization and System Design” by GREENWALD in view of “Real-Time Deques, Multihead Turing Machines, and Purely Functional Programming” by CHUANG.

As to claim 16, GREENWALD teaches a method of reducing an average number of synchronization operations per access operation for a dynamically-allocated, linked-list representation of a double ended queue, deque, (deque) the method comprising: encoding the deque using a subset of nodes (word) of the linked-list including spare nodes at one end of the deque (node having an Invalid value in pop operations); defining opposing-end variants of push and pop access operations on the deque (pushTop / popTop / pushBottom / and popBottom operations) (pg. 219 and 220), wherein execution of an access operation is linearizable and non-blocking with respect to any other execution of the access operation (pg. 217-218, “Figures D.19 and D.20 contain an implementation of a concurrent deque that solves the problem of simultaneous popBottom and PopTop on a one element deque...thus allowing top and bottom to be stored in two independent words and to proceed mostly in parallel.”). However, GREENWALD does not teach a spare node maintenance operation.

CHUANG teaches a deque that has defined opposing-end variants of at least one spare node maintenance operation (empty dq operation) (pg. 4-5). Therefore, it would be obvious to one skilled in the art at the time of the invention to combine the teachings of GREENWALD with the teachings of CHUANG in order to accomplish a push or pop operation on either end of a queue in  $O(1)$  time (abstract).

As to claim 23, GREENWALD teaches each of the pop access operations includes a single synchronization operation per uncontended execution path thereof (via DCAS command in operations) (pg. 219-220).

As to claim 24, GREENWALD teaches each of the push access operations includes a single synchronization operation per uncontended execution path thereof (via DCAS command in operations) (pg. 219-220).

As to claim 5, GREENWALD substantially discloses the invention above. However, GREENWALD does not teach a spare node maintenance operation.

CHUANG teaches a deque that has defined a spare node maintenance operation (empty dq operation) (pg. 4-5). Therefore, it would be obvious to one skilled in the art at the time of the invention to combine the teachings of GREENWALD with the teachings of CHUANG in order to accomplish a push or pop operation on either end of a queue in  $O(1)$  time (abstract).

7. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Non-Blocking Synchronization and System Design" by GREENWALD in view of "Data Structures & Algorithm Analysis in C++" by WEISS.

As to claims 14 and 15, GREENWALD teaches a doubled-ended concurrent shared object (deque / stack / etc). However, GREENWALD does not teach severed nodes are explicitly reclaimed.

WEISS teaches a concurrent shared object (list) wherein severed nodes are reclaimed by an automatic storage reclamation facility (pg. 78-79, Memory Reclamation and the Big Three) (“...Thus memory reclamation will be handled automatically by remove!...”). WEISS also teaches that the shared object is double-ended (double linked list) (pg. 79-80). It is inherent that since the node has a pointer attribute that it is destroyed when the node is reclaimed. Therefore, it would be obvious to combine the teachings of GREENWALD with the teachings of WEISS in order to effectively handle memory reclamation (pg. 79).

### ***Allowable Subject Matter***

8. Claim 64 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The claim is allowable for at least the following reasoning: The claim details an apparatus comprising double-ended sequence represented by an interior subset of nodes of a doubly-linked list, including left and right sentinel ones immediately adjacent the interior subset, and one or more spare nodes beyond each of the left and right sentinel nodes, means for coordinating competing left and right-end access operations



and at least one spare node maintenance operation on the list employing instances of a linearizable synchronization operation and distinguishing node value encodings and means for explicitly reclaiming a node severed from the list. The use of the spare node maintenance operations in conjunction with the deque by manipulating the sentinel nodes allows for the expansion of the linked-list to include additional nodes without allocation of additional storage (pg. 6, paragraph 1016). The prior art at best teach a deque having opposing end access operations but does not teach the cited spare node maintenance operation controlling the number of spare nodes beyond the left and right sentinel nodes and that the maintenance operations is linearizable and non-blocking with respect to another operation. Therefore, the claims are allowable over the prior art of record.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lewis A. Bullock, Jr. whose telephone number is (703) 305-0439. The examiner can normally be reached on Monday-Friday, 8:30 am - 5:00 pm.

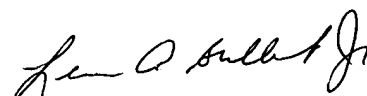
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John A Follansbee can be reached on (703) 305-8498. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0286.

A handwritten signature in cursive script, appearing to read "Len A. Bullock Jr.", located in the middle right portion of the page.

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